Using Remote Sensing and GIS to Detect and Quantify Biomass Burning

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Introduction:
This project describes a new and novel method for calculating the emissions from biomass burning by combining the proven satellite-based capability to remotely sense biomass burning with GIS land use databases and specially developed computer algorithms.

The Problem:

- Each year Americans are exposed to smoke from thousands of fires in Mexico and Central America set to clear land for farming, and biomass burning that occurs within the U.S. on a huge scale. Smoke from these fires, in the form of PM 2.5, contributes to premature death from heart and lung disease.
- Biomass burning is an important contributor to the problem of regional haze, and is a significant contributor to the production of greenhouse gases, such as carbon dioxide and methane.
- In 2000, approximately 8,900,000 harvested crop land acres, 18,000,000 rangeland acres, and 9,500,000 forest acres were burned.
- Conventional methods for estimating emissions from forest fires rely on querying existing federal and state records and are resource intensive, inaccurate, and incomplete. No proven methodology currently exists for gathering data on agricultural emissions.
- A variety of previous researchers have utilized satellite-based remote sensing to detect active fires, smoke, and burned areas, but not to calculate emissions.

The Solution:

- The satellite data stream would be acquired and analyzed for the presence of fire, smoke, or charred areas. These areas would be identified, the burn efficiency estimated, and the areas geolocated.
- GIS land cover databases would be queried to determine the type of vegetation burned. Emissions would be calculated and the data processed.
- A partnership has been formed between EPA Region 6, OAQPS, EPA ORD, and NASA to complete this project. Highly qualified individuals stand ready to work on this project, pending project funding.

The Benefits:

- Biomass burning emissions from remote sensing and GIS technology will lead to dramatic improvements in the temporal and spatial representation in models, allowing us to better model reality.
- Emission data would be used to improve our understanding of the effects of biomass burning on human health, via chemical transport modeling. Emission data would be available in near real time, opening up the potential to use these emission estimates for air quality forecasting.